

**Space Science Seminar**  
**WEDNESDAY, 2015 September 23**  
**10:30 a.m.**  
**NSSTC/2096**

**Probing the Particle Accelerator that Lives in  
Thunderstorms**

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Host: Dr. Michael Briggs (UAH)

Thunderstorms are nature's most powerful terrestrial particle accelerators. The high-voltage, high-current electrical discharges of lightning are a familiar feature of a summer storm, but only recently have we come to learn that cloud-to-ground lightning strokes are accompanied by bursts of X-rays, that thunderstorms glow in gamma-rays, and that they occasionally produce intense flashes of gamma-rays and launch charged particles into space at relativistic energies. Complementing its primary astrophysics mission, the Fermi Gamma-ray Space Telescope has been measuring these Terrestrial Gamma-ray Flashes (TGFs) in unprecedented detail since its launch in 2008. These and other measurements indicate that the strong electric fields in thunderstorms generate runaway avalanches of relativistic electrons. The intense current pulse of the runaway avalanche is a previously unrecognized mechanism that competes with lightning to discharge the fields in a thunderstorm. The details of the relationship between TGFs and lightning remain obscure. I will give an overview of the energetic radiation produced by thunderstorms and the research program underway at NRL to measure those emissions from the ground and from space and to model their sources.

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